Support for biofuels: Considerations for policymakers

International Biofuels Economic Outlook Panel

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Political economy of liquid biofuels

Divergent groups favor liquid biofuels

- Agribusiness, farmers
- Governments: energy security, rising oil import bills, job creation, growing fuel subsidies
- Some environmentalists – a wide range of views
- General public appeal of renewable fuel

Complexity of interactions between energy, agriculture, environment, and macro-economy makes it difficult to see the issues clearly

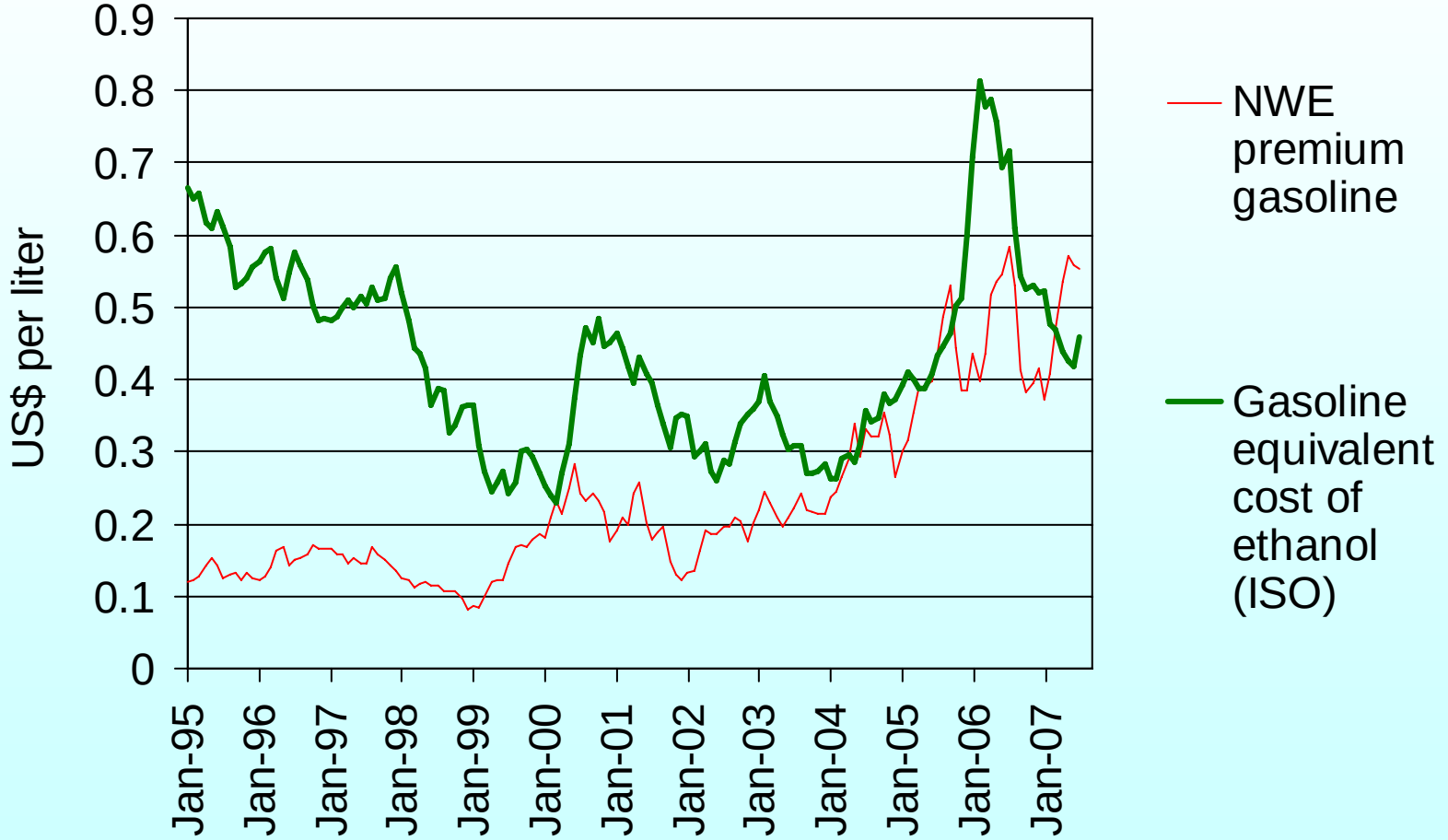
Questions

- How has biofuel economics fared historically?
- Are subsidies a viable policy option for developing countries?
- Can Brazilian experience be replicated?
- Can biofuels mitigate oil price increases and price volatility?
- How are biofuels expected to affect, and be affected by, crop prices in the future?

First-generation liquid biofuels

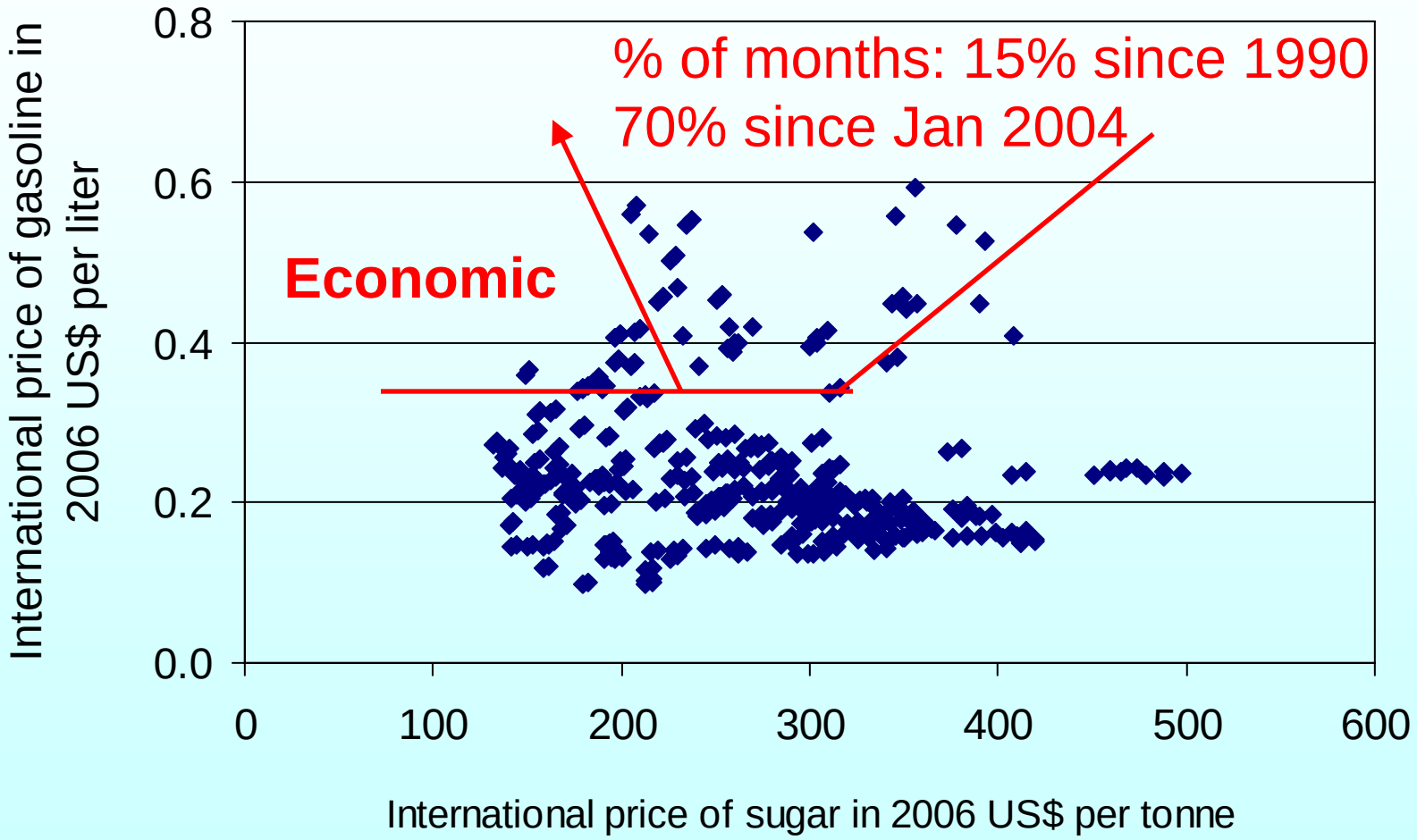
- Limitations in economics and production potential widely acknowledged
- More than half of production cost due to feedstock
- Domestic production and consumption of biofuels economic under few favorable circumstances (Brazil in 2005 and 2007), but uneconomic most of the time
- Hence heavily protected, mostly domestic, limited trade
- Types of support
  - Fuel tax and other fuel charge/fee reduction (universal)
  - Mandatory blending or consumption requirements
  - Import tariffs (primarily on ethanol)
  - Production-linked subsidies
  - Upstream (OECD agricultural policies) and downstream subsidies

Economics of ethanol production from sugarcane



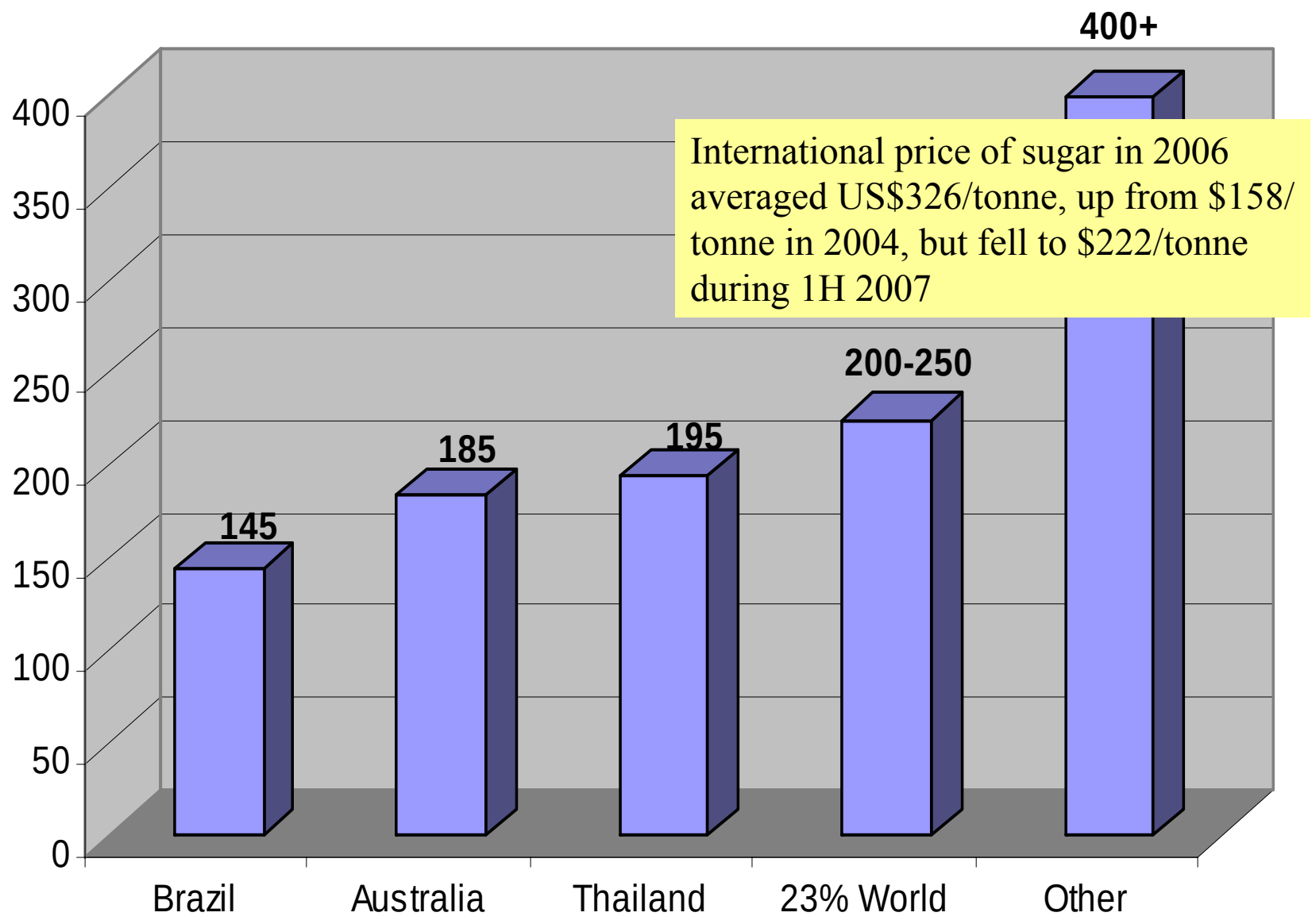
*83% sugar and 17% molasses, and molasses priced at 25% of sugar; 20% fuel economy penalty for ethanol

Landlocked economies with sugar production cost of $225/tonne



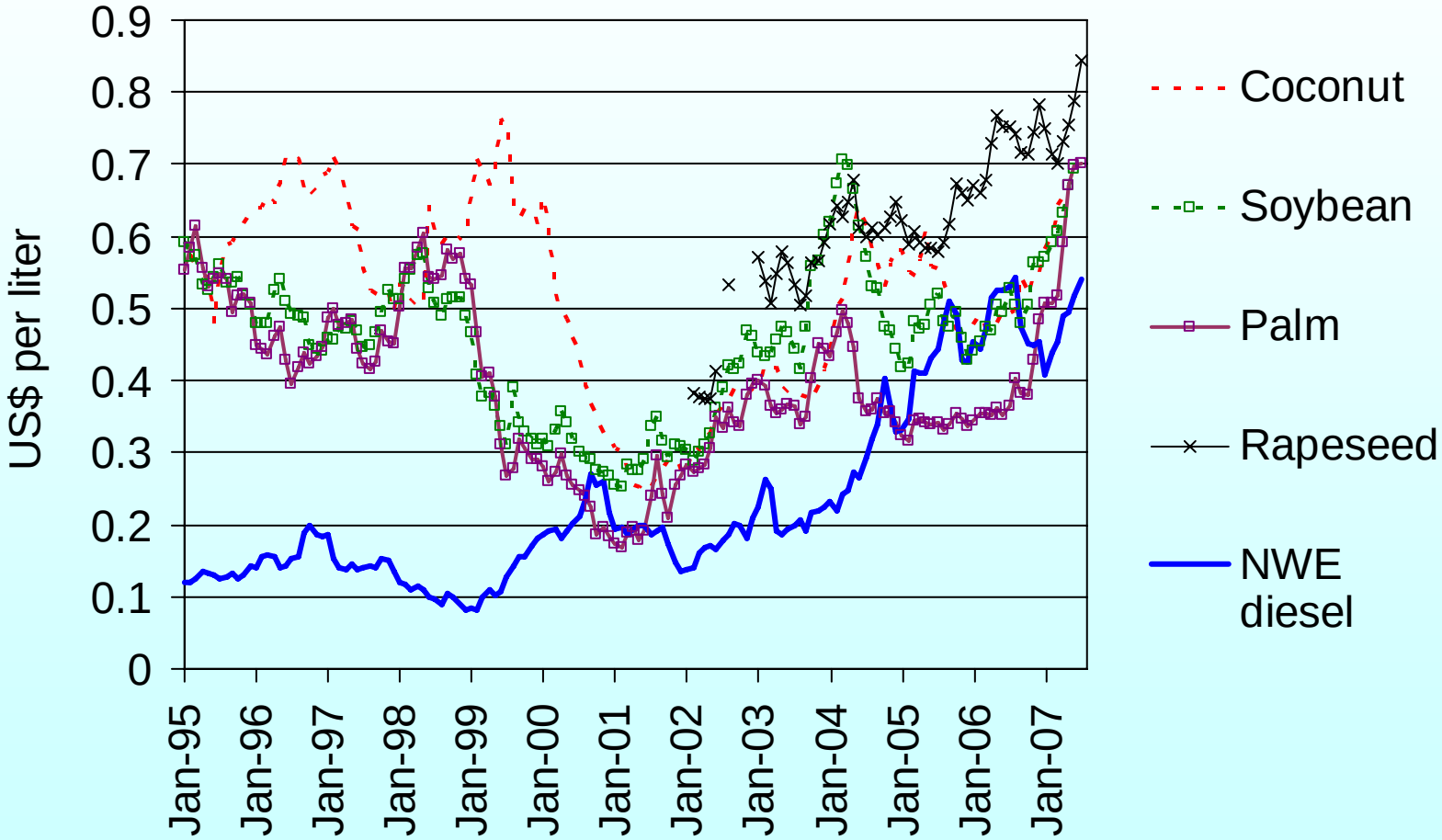
*83% sugar and 17% molasses, and molasses priced at 25% of sugar; transport costs $100 per tonne of sugar & $150 per tonne of gasoline; 20% fuel economy penalty

Sugar Production Costs (US$/tonne), mid-2005



International price of sugar in 2006 averaged US$326/tonne, up from $158/tonne in 2004, but fell to $222/tonne during 1H 2007

Vegetable oil vs. diesel prices



*Price data from USDA FAS, World Bank and Energy Intelligence

Government support for consumers and domestic producers

Location	Tax reduction in US$ per liter of biofuel	
	Ethanol	**Biodiesel**
Germany	0.83	0.60 (to end-July 2006)
Australia	0.33	0.33
USA (credit)	0.135	0.26 or 0.13
Thailand	**0.65 (April 2006)**	
São Paulo	**0.30 (June 2005)**	

*__European premium gasoline in 1H 2007 $0.49/liter__

High tariffs on ethanol to prevent subsidies from going to imports

USA: $0.1427 per liter + 2.5/1.9%

EU: US$0.26 / 0.14 per liter

Brazil: 20%

Accounting for environmental externalities

- GHG emission reduction: at $8-20 per tonne of CO_2-equivalent, expect about $0.01-0.04 per liter
  - Much smaller than tax reductions provided to biofuels today
- Calculations on US subsidy per tonne of CO_2 equivalent (IISD)
  - $520 in 2006 for maize to ethanol
  - $118–147 for cellulosic ethanol if the current subsidy structure is maintained

Factors contributing to large-scale use of ethanol in Brazil

- Extremely favorable natural endowments in the center-south, enabling very low-cost sugarcane production
  - Entirely rain-fed
  - Seemingly unlimited supply of land (although concerns about displacement of virgin cerrados)
- Outstanding agricultural research
  - Each mill uses about 15 varieties of cane
  - Constant development of new commercial varieties
  - Precise computer optimization of every step in the ethanol production process
- Functioning capital market, availability of managerial and technical skills, reasonable infrastructure
- Mandate and fuel tax reduction

Replicability

- About 100 countries grow sugar cane, but none matches Brazilian center-south's low cost
- Land and water requirements –
  - Zambia has both plentiful land and water, but not necessarily at the same locations
- Capital market and infrastructure development, availability of managerial and technical skills
- Requirement for large fuel tax reductions today ↔ petroleum fuels an important source of government revenue in low-income countries

Can biofuels provide a solution to high oil prices?

- Biofuel production a small fraction of petroleum fuel production for the foreseeable future $\Rightarrow$ biofuels will be price takers
- Marginal demand and marginal supply set prices $\Rightarrow$ 1–2% *net* displacement of global oil demand (2–7% of transportation fuels) might moderate oil price increases

Land requirements

First generation biofuels (LMC International)	Displacing 5% of gasoline and diesel worldwide would be a challenge – if distributed globally, 15+% more land (100+ million hectares)
Second generation biofuels	Much greater potential because of ability to use wastes, residues, and non-food crops

Will high oil prices help biofuel economics?

- More room for cost recovery
- Higher production and market delivery costs (e.g., pre-FOB) because of higher energy prices
- If biofuels significantly increase demand for feedstocks, their prices will be driven up
- **Increasing link to oil prices**

Impact of higher biofuel demand

- Higher production of biofuels will raise food prices
  - Good for producers, bad for consumers, especially the poor
  - Most evidence suggests poor farming rural households are ***net buyers*** of food
  - On balance, food security of the poor will be reduced
- Price increase in 2005-2006:
  - 67% increase for maize, 45% for palm oil, 26% for rapeseed oil, 33% for sugar
- Higher crop prices already hurting biofuel industry (e.g., South Africa)
- Correlation with gasoline and diesel prices
  - 75% for sugar and 30% for palm oil since Jan 2002, 75% for rapeseed oil since Jan 2003.
  - Threshold diversion level for strong correlation to emerge?

Concluding remarks

- Reasons for supporting biofuels are attractive: rural development, reducing global warming, enhancing energy security. But a biofuel program may not be a good vehicle for addressing them; separate policy solutions may be more cost-effective.
- The economics of first generation biofuels is very much location-specific, as are environmental benefits.
- Legitimate government support for biofuels is R&D, and useful especially in developing country context.
- For energy security, it would be helpful to view liquid biofuels in context.

Additional thoughts and materials

Available at:

http://siteresources.worldbank.org/INTOGMC/Resources/Considering_trade_policies_for_liquid_biofuels.pdf